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EXAMINER

LU, TOM Y

ART UNIT PAPER NUMBER

2621

DATE MAILED: 02/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/703,423

Applicant(s)

COLMENAREZ ET AL.

Examiner

Tom Y Lu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-17 is/are allowed.
- 6) ☒ Claim(s) 1-14 and 18-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. The written response and amendment filed on December 15, 2003 has been entered.
2. Claims 1-21 are pending.

Response to Arguments

3. Applicant's arguments with respect to claims 1, 20 and 21 have been considered but are moot in view of the new ground(s) of rejection.

The Brill Reference:

Applicant argues the Brill reference does not teach the newly amended limitation of "wherein the optimum trajectory of a person is maximized through linear transformation". As a result, the Brill reference fails to anticipate all the elements cited in the claims.

Upon further review of specification, and in light of applicant's arguments, the examiner agrees the Brill reference does not explicitly teach use of linear transformation to maximize the optimum trajectory of a person. Nonetheless, such technique is well known in the art. Accordingly, a new reference is cited in the following office action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-14 and 18-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the

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relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

- a. Referring to Claim 1, the examiner does not find any explanation in the specification with regard to the limitation of "the optimum trajectory of a person is maximized through linear transformation". The closest explanations given in the specification, in page 6, lines 10-15, are "the position of a person in a room can be obtained from the linear transformation" and "the linear transformation is used to obtain a sub-window of the image that is invariant to rotation and scale". The examiner finds no explanation with regard to maximizing the optimum trajectory of a person.
- b. Claims 2-14 and 18-19 are rejected as being dependent upon Claim 1.
- c. Claims 20 and 21 are rejected for the same reason given in Claim 1.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-14 and 18-21 are rejected under 35 U.S.C. 112 2nd paragraph.
 - a. Claim 1 recites the limitation "the optimum trajectory" in line 8. There is insufficient antecedent basis for this limitation in the claim.
 - b. Claims 2-14 and 18-19 are rejected as being dependent upon Claim 1.
 - c. Claims 20 and 21 are rejected for reciting the same limitation.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-8 & 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brill et al (U.S. Patent No. 6,542,621 B1) in view of Brandstetter (U.S. Patent No. 5,185,815).

a. Referring to Claim 1, Brill discloses processing a sequence of images (Brill at column 4, lines 59-60, discloses processing a succession of images provided by the video camera 12) to generate a statistical model (Brill at column 6, lines 5-8, teaches probabilistic templates or p-templates. The path of a p-template through the scene represents the track of a given person, which is maintained by the tracking system. Such probabilistic template is the claimed "statistical model") for each person to be tagged (Brill at column 6, lines 10-11, teaches the p-template is assigned to each of tracked objects in the video sequence. Note the objects herein are people as shown in figures 6A-6D), the statistical model incorporating at least one appearance feature (Brill at column 8, lines 22-23 discloses a p-template includes a raw color corrected probability. Note color is an appearance feature) and at least one geometric feature (Brill at column 7, lines 37-39, teaches the p-template also depends on the location of the tracked object. The location herein corresponds to the claimed "geometric feature") of the tagged person; applying the model to at least one subsequent image in order to perform at least one of a detection operation, a location operator and a tracking operation for the tagged person (Brill at column 8, line 34, teaches a p-template is applied for each tracked object, which implies the p-template is applied in a tracking operation); and controlling an action of the image processing system based on a result of the at least one operation (Brill at column 1, line

41, teaches applying such tracking technique in physical security environment, such as surveillance camera, which the tracking algorithm will direct the video camera to track the given objects). However, Brill does not teach the optimum trajectory of a person is maximized through linear transformation. Brandstetter at column 10, lines 18-36, teaches determining the object position in the correlation plane using linear transformation. At the time the invention was made, a person of ordinary skill in the art would have been motivated to do this because Brill at column 5, lines 1-10, teaches using the position in the image of the midpoint to identify the scale of a person would appear in the image, where Brill does not explicitly state the rotation of the image is invariant. Brandstetter at column 10, lines 18-36, teaches deriving the orientation of the tracking object in the correlation plane through use of linear transformation to achieve rotational invariance.

b. Referring to Claim 2, Brill discloses wherein the sequence of image comprises a video segment (column 4, lines 59-60).

c. Referring to Claim 3, Brill discloses wherein the processing step further includes processing the sequence of images to generate a plurality of statistical models, each of the models corresponding to a particular tagged person (Brill at column 6, lines 10-11 teaches using plurality of p-templates when tracking objects in video sequence. Brill at column 8, line 34 teaches such p-template is generated for each tracked object).

d. Referring to Claim 4, Brill discloses wherein the appearance feature comprises at least one of a color feature and a texture feature (Brill at column 8, lines 23-24, discloses color feature).

e. Referring to Claim 5, Brill discloses wherein the geometric feature comprises at least one of a region shape and a region position for a given one of a plurality of regions associated with the statistical model (Brill at column 7, lines 37-38, teaches the p-template depends on object locations, also see column 5, lines 64-67, and column 6, lines 1-2).

f. Referring to Claim 6, Brill discloses wherein the statistical model is generated at least in part by segmenting a given image into a number N of different regions of similar appearance (Brill teaches at column 6, lines 10-11 teaches applying 2 p-templates, and they are segmented in different regions in a video image as shown in figure 5. And they have similar appearance, both are ovals).

g. Referring to Claim 7, Brill discloses wherein the statistical model generated for a given person comprises a likelihood probability function which indicates the likelihood that the person is presented in a given image (Brill teaches generated p-template for a given object in a given video sequence, see column 6, lines 5-17)

h. Referring to Claim 8, Brill discloses wherein the likelihood probability function $P(I|\Omega)$ for person Ω is computed as $P(I|\Omega) = \sum_{r=1,2,\dots,N} P(R_r|\Omega)P(r|\Omega)$ (Brill at column 9, line 56, discloses use of the Bayesian probabilistic framework), where R_r is a function of the at least one appearance feature and the at least one geometric feature (Brill teaches use of the appearance feature for p-template), and r is an index identifying one of N regions of similar appearance within the image I (Brill teaches calculating the p-template for a given object in a given video image).

i. Referring to Claim 18, Brill discloses wherein the controlling step comprises generating an output of the image processing system based on the result of the at least one operation (see explanation in claim 1).

j. Referring to Claim 19, Brill discloses wherein the controlling step comprises altering an operating parameter of the image processing system based on the result of the at least one operation (Brill at column 9, lines 48-51, teaches when a new person enters the scene or a person leaves, the tracking algorithm will alter some parameter in the tracking operation).

k. With regard to Claim 20, all the limitations are addressed in Claim 1.

l. With regard to Claim 21, the only difference between Claim 21 and Claim 1 is Claim 21 calls for an article of manufacture comprising a storage medium for storing one or more programs. Brill at column 3, line 25 teaches using a computer workstation 13 to perform image processing, which inherently includes a storage medium for storing one or more programs.

7. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brill et al and Brandstetter as applied to claim 1 above, and further in view of Chang et al (U.S. Patent No. 5,999,651).

a. Referring to Claim 9, Brill discloses so-called statistical model generated for a given person comprises a likelihood probability function, which contains motion values as parameters. (Brill: column 3, lines 36-54 and column 7, lines 27-31) However, Brill does not explicitly distinguish the use of global motion and location motion. Chang at column 4, lines 17-37, teaches obtaining first contour

model using global motion estimation, and at column 5, lines 13-20, teaches performing location motion estimation based on the first contour model to obtain a second contour model. Therefore, the estimate probability described at column 6, line 45, is a probability function based on global motion parameter and location motion parameter, which corresponds to the claimed “probability function” $P(I|T, \xi, \Omega)$. In addition, Chang at column 4, line 28, teaches $d_i(t) = \hat{d}_i(t-1)$ as the claimed “linear transformation”, $v_i(t)$ at column 5, line 14 is the claimed “a discrete variable”. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to apply the probability estimation technique taught by Chang in Brill’s system. One of ordinary skill in the art would have been motivated to do this because Chang and Brill both provide teachings for object tracking (even though Brill performs tracking on people, and Chang gives an example of tracking a bird on a lake, Chang does point out at column 1, line 19 that his system is also applicable to human), and using probability estimation to locate the object movements. Additionally, Chang provides local motion probability to detect the object movements more precisely, which reduces the error estimation rate.

- b. Referring to Claim 10, Chang discloses wherein a location of the person is determined using the linear transformation T (Chang at column 4, line 28 teaches $d_i(t) = \hat{d}_i(t-1)$ as the linear transformation).

- c. Referring to Claim 11, Chang discloses wherein a pose of the person is determined using the discrete variable ξ (Chang at column 5, line 14 teaches $v_i(t)$ as the discrete variable).
- d. Referring to Claim 12, Chang discloses wherein the linear transformation T is used to obtain a sub-window of the image I that is invariant to rotation and scale (Chang discloses use of snake tracking, which is inherently invariant to rotation and scale).
- e. Referring to Claim 13, Chang discloses wherein the linear transformation T is implemented using a bilinear interpolation technique with a reference point x_c , a rotation angle θ , and a scaling factor s (Chang discloses reference point at column 4, line 25, the rotation angle and scaling factor are inherently included in snake tracking algorithm).
- f. Referring to Claim 14, Chang discloses wherein the local motion is modeled using a discrete set of states of the variable ξ to capture M different poses of the person (Chang at column 5, line 14, discloses snake point $v_i(t)$).

Allowable Subject Matter

8. Claims 15-17 are allowed.

The following is an examiner's statement of reasons for allowance:

- a. Claim 15 defines a statistical model generated for a given person Ω and image I comprises a likelihood probability function $P(I | T, \xi, \Omega) = \sum_{pix \in I} P(pix | T, \xi, \Omega)$, where r is an index to regions of similar appearance and N is a total number of

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such regions, $r=1,2,\dots,N$, and

$$P(\text{pix} | r, T, \xi, \Omega) = \max[P(\text{pix} | r, T, \xi, \Omega)P(r | \xi, \Omega)],$$

where $P(\text{pix} | r, T, \xi, \Omega)$ is the probability of observing pixel pix assuming that it belongs to an r -th region of the model on a pose ξ , and $P(r | \xi, \Omega)$ is the prior probability of the region at that pose.

- b. Claims 16-17 are dependent upon Claim 15.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Y Lu whose telephone number is (703) 306-4057. The examiner can normally be reached on 8:30AM-5PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Y. Lu



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